MMS Science 8 Subject Group Overview

Unit Name	Energy Forms & Transformations	Thermal Energy & Phase Changes	Atomic Structure & Periodic Table	Classification & Properties of Matter	Waves	Non-Contact Forces	Motion & Newton's Laws
Time Frame	6 Weeks	4 Weeks	5 Weeks	4 Weeks	6 Weeks	4 Weeks	4 Weeks
Standards	S8P2.a., b., c.	S8P1.b / S8P2.d	S8P1.c., d., e.	S8P1.a.,d., f.	S8P4.a., b., c., d., e., f., g.	S8P5.a., b., c.	S8P3.a., b., c.

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	Science & Engineering Practices	Students will: ● Analyze and interpret data to create graphical displays that illustrate the relationships of kinetic energy to mass and speed and potential energy to mass and height of an object. ● Plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system (e.g. roller coasters, pendulums, rubber bands, etc.). ● Construct an argument to support a claim about the type of energy transformations within a system [e.g., lighting a match (light to heat), turning on a light (electrical to light).	Students will: ● Develop and use models to describe the movement of particles in solids, liquids, gasses, and plasma states when thermal energy is added or removed. ● Plan and carry out investigations on the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or gas (convection).	Students will: ● Develop models (e.g., atomic level models, including drawings, and computer representations) by analyzing patterns within the periodic table that illustrate the structure, composition, and characteristics of atoms (protons, neutrons, electrons) and simple molecules. ● Plan and carry out investigations to compare and contrast chemical (i.e., reactivity, combustibility) and physical (i.e., density, melting point, boiling point) properties of matter. ● Construct an argument based on observational evidence to support the claim that when a change in a substance occurs, it can be classified as either chemical or physical.	Students will: ● Develop and use a model to compare and contrast pure substances and mixtures. ● Construct an argument based on observational evidence to support the claim that when a change in a substance occurs, it can be classified as either chemical or physical. ● Construct an explanation based on evidence to describe conservation of matter in a chemical reaction including the resulting differences between products and reactants.	Students will: ● Ask questions to develop explanations about the similarities and differences between electromagnetic and mechanical waves. ● Construct an explanation using data to illustrate the relationship between the electromagnetic spectrum and energy. ● Design a device to illustrate the practical applications of the electromagnetic spectrum (e.g., communication, medical, military). ● Develop and use a model to compare and contrast how light and sound waves are reflected, refracted, absorbed, diffracted, or transmitted through various materials. ● Analyze and interpret data to predict patterns in the relationship between density of media and wave behavior (i.e., speed).	Students will: ● Construct an argument using evidence to support the claim that fields (i.e., magnetic fields, gravitational fields, and electric fields) exist between objects exerting forces on each other even when the objects are not in contact. ● Plan and carry out investigations to demonstrate the distribution of charge in conductors and insulators. ● Plan and carry out investigations to identify the factors (e.g., distance between objects, magnetic force produced by an electromagnet with varying number of wire turns, varying number or size of dry cells, and varying size of iron core) that affect the strength of electric and magnetic forces.	Students will: ● Analyze and interpret data to identify patterns in the relationships between speed and distance, and velocity and acceleration. ● Construct an explanation using Newton's Laws of Motion to describe the effects of balanced and unbalanced forces on the motion of an object. ● Construct an argument from evidence to support the claim that the amount of force needed to accelerate an object is proportional to its mass (inertia)

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						● Develop and use a model (e.g., simulations, graphs, illustrations) to predict and describe the relationships between wave properties (e.g., frequency, amplitude, and wavelength) and energy. ● Develop and use models to demonstrate the effects that lenses have on light (i.e. formation of an image) and their possible technological applications.		
	Approaches To Learning Instructional Strategies	**Self-Management: Organization:** Bring necessary equipment and supplies to class. **Self-Management: Affective:** Practice focus and concentration.	**Communication:** Read critically and for comprehension. **Communication:** Take effective notes in class.	. **Critical Thinking:** Identify trends and forecast possibilities **Reflection:** Consider content: -What did I learn about today? -What don't I understand? -What questions do I have now?	**Communication:** Make inferences and draw conclusions. **Communication:** Negotiate ideas and knowledge with peers and teachers	**Critical Thinking:** Use models and simulations to explore complex systems and issues. **Collaboration:** Work effectively with others.	**Critical Thinking:** Make logical, reasonable judgments and create arguments to support them. **Social: Collaboration:** Delegate and take responsibility as appropriate.	**Research:** Collect and analyze data to identify solutions and/or make informed decisions. **Critical Thinking:** Consider consequences to events.
	Statement of Inquiry	Scientific and technical advancements have led to the development of multiple systems that	Scientific and technical innovations enable us to use thermal energy	Scientific and technical advancements enable scientists to understand relationships and patterns	Scientists and technical innovations allow us to visualize, model, and explain	Advances in science and technology have developed humans' understanding of the	Scientific and technical innovations allow us to understand the relationships between	Scientific and technical advancements have led to the development of a variety of models that can be used to

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		facilitate energy transformations. **<u>Phenomena</u>**: How can we use forms of energy and energy transformations within a system to develop a device that can help rescue workers during an emergency? **CER:** Students answer the phenomenon in a Claim-Evidence-Reasoning constructed response as a formative assessment.	changes for practical applications. **<u>Phenomenon</u>:** How can we use our understanding of states of matter, molecular motion, and forms of heat transfer to help us cook food away from modern appliances? **CER:** Students answer the phenomenon in a Claim-Evidence-Reasoning constructed response as a formative assessment	that exist related to the structure and function of elements in our natural world. **<u>Phenomena:</u>** How can we use our understanding of the atomic structure, periodic table, and element's physical and chemical properties to determine which elements would be better to use in creating devices and how they impact our environment? **CER:** Students answer the phenomenon in a Claim-Evidence-Reasoning constructed response as a formative assessment.	properties of and changes in systems of matter. **<u>Phenomena</u>**: How can we use our understanding of pure substances and mixtures to help us get clean drinking water in the middle of the woods? **CER:** Students answer the phenomenon in a Claim-Evidence-Reasoning constructed response as a formative assessment.	uses, behaviors, and effects of electromagnetic and mechanical energy. **<u>Phenomena:</u>** How can we use our understanding of electromagnetic and mechanical waves to develop devices for people who have a hearing or seeing disability? **CER:** Students answer the phenomenon in a Claim-Evidence-Reasoning constructed response as a formative assessment.	objects in magnetic, gravitational, and electric fields. **<u>Phenomena:</u>** How can we use our understanding of non-contact forces to understand how to develop wireless charging of our commonly used devices? **CER:** Students answer the phenomenon in a Claim-Evidence-Reasoning constructed response as a formative assessment.	demonstrate changes in motion of balanced and unbalanced forces on objects. **<u>Phenomena:</u>** How can we use Newton's 3 Laws of Motion and Motion Graphs to correctly create and/or evaluate a stunt performance within a movie? **CER:** Students answer the phenomenon in a Claim-Evidence-Reasoning constructed response as a formative assessment.

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	Global Context	**Scientific and Technical Innovation** Students will explore the natural world and its laws; the interaction between people and the natural world; how humans use their understanding of scientific principles; the impact of scientific and technological advances on communities and environments; the impact of environments on human activity; how humans adapt environments to their needs.	**Scientific and Technical Innovation** Students will explore the natural world and its laws; the interaction between people and the natural world; how humans use their understanding of scientific principles; the impact of scientific and technological advances on communities and environments; the impact of environments on human activity; how humans adapt environments to their needs.	**Scientific and Technical Innovation** Students will explore the natural world and its laws; the interaction between people and the natural world; how humans use their understanding of scientific principles; the impact of scientific and technological advances on communities and environments; the impact of environments on human activity; how humans adapt environments to their needs.	**Scientific and Technical Innovation** Students will explore the natural world and its laws; the interaction between people and the natural world; how humans use their understanding of scientific principles; the impact of scientific and technological advances on communities and environments; the impact of environments on human activity; how humans adapt environments to their needs.	**Scientific and Technical Innovation** Students will explore the natural world and its laws; the interaction between people and the natural world; how humans use their understanding of scientific principles; the impact of scientific and technological advances on communities and environments; the impact of environments on human activity; how humans adapt environments to their needs.	**Scientific and Technical Innovation** Students will explore the natural world and its laws; the interaction between people and the natural world; how humans use their understanding of scientific principles; the impact of scientific and technological advances on communities and environments; the impact of environments on human activity; how humans adapt environments to their needs.	**Scientific and Technical Innovation** Students will explore the natural world and its laws; the interaction between people and the natural world; how humans use their understanding of scientific principles; the impact of scientific and technological advances on communities and environments; the impact of environments on human activity; how humans adapt environments to their needs.
	Key Concepts	**Systems and system models (MYP/CCC)** Systems are sets of interacting or interdependent components. Systems provide structure and order in human, natural and built environments. Systems can be static or dynamic, simple or complex.	**Change (MYP/CCC)** Change is a conversion, transformation or movement from one form, state, or value to another. Inquiry into the concept of change involves understanding and evaluating causes, processes and consequences.	**Relationships (MYP)** Relationships are the connections and associations between properties, objects, people and ideas - including the human community's connections with the world in which we live. Any change in a relationship brings consequences.	**Change (MYP/CCC)** Change is a conversion, transformation or movement from one form, state, or value to another. Inquiry into the concept of change involves understanding and evaluating causes, processes and consequences.	**Development (MYP)** Development is the act or process of growth, progress or evolution, sometimes through iterative improvements.	**Relationships (MYP)** Relationships are the connections and associations between properties, objects, people and ideas - including the human community's connections with the world in which we live. Any change in a relationship brings consequences.	**Systems and system models (MYP/CCC)** Systems are sets of interacting or interdependent components. Systems provide structure and order in human, natural and built environments. Systems can be static or dynamic, simple or complex.

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	Related Concepts	Energy (MYP/CCC) Transformation (MYP)	Energy (MYP/CCC)	Patterns (MYP/CCC)	Models (MYP)	Effects (MYP)	Interaction (MYP)	Movement (MYP)
	Disciplinary Core Ideas	<u>Connecting Core Ideas</u> ● Energy ● Energy Transformations ● Kinetic & Potential	<u>Connecting Core Ideas</u> ● Matter (structure, composition, properties) ● Thermal Energy ● States of Matter	<u>Connecting Core Ideas</u> ● Matter (structure, composition, properties) ● Elements and compounds ● Chemical and Physical Properties and Changes	<u>Connecting Core Ideas</u> ● Mixtures and solutions ● Matter (structure, composition, properties) ● Elements and compounds ● Conservation of Matter	<u>Connecting Core Ideas</u> ● Wave Properties (frequency, amplitude, wavelength, and energy) ● Energy (electromagnetic spectrum) ● Light and Sound ● Wave Propagation (reflection, refraction, absorption, diffraction, transmission) ● Lenses	<u>Connecting Core Ideas</u> ● Forces (friction, gravitational, electrical, and magnetic) ● Force fields ● Conductors and insulators	<u>Connecting Core Ideas</u> ● Energy ● Kinetic and Potential ● Force and Motion ● Speed and Distance ● Speed and Acceleration ● Newton's Laws of Motion ● Balanced and Unbalanced Forces
	MYP Assessments / Performance Tasks	**Common Assessments Title and Criterion:** Energy Forms and Transformations Unit Assessment Paper I (Science: A,D) Design a System To Charge a Device Using Human Power (Design: A-D) Pendulum Lab (Science: A-D)	**Common Assessments Title and Criterion:** Thermal Energy & Phase Changes Unit Assessment Paper I and Paper II Structure and Properties of Matter Unit Assessment (Science: A,D)	**Common Assessments Title and Criterion:** Atomic Structure & Periodic Table Unit Assessment Paper I (Science: A,D) Lab: Observing & Using Physical & Chemical Properties and Changes (Science: B,C) Elements on the Periodic Tablet (Science A,D)	**Common Assessments Title and Criterion:** Classification & Properties of Matter Unit Assessment Paper I and Paper II (Science: A,D) Designing a Filtration System for Clean Water (Design: A-D) Lab: Chemical Reactions and the LOCOM (Science: B,C)	**Common Assessments Title and Criterion:** Waves Unit Assessment Paper I (Science: A,D) Lab: Exploring Wave Behaviors (Science: B,C) Lab: Lenses (Science: B,C)	**Common Assessments Title and Criterion:** Non-Contact Forces Unit Assessment Paper I and Paper II (Science: A,D) Design an Electromagnet (Design: B-D) Lab: Exploring Magnets & Magnetic Fields (Science: B,C) Lab: Investigating Electrostatics (Science: B,C)	**Common Assessments Title and Criterion:** Motion & Newton's Laws Unit Assessment Paper I (Science: A,D) Lab: Exploring Motion (Science: B,C) Lab: Using Spring Scales to Measure Force (Science: B,C)

	Differentiation For Tiered Learners	Discovery Education Science Techbook NGSS Case Studies for Differentiated Learners NGSS: All Standards, All Students Extensions - Enrichment Tasks/Projects	Discovery Education Science Techbook NGSS Case Studies for Differentiated Learners NGSS: All Standards, All Students Extensions - Enrichment Tasks/Projects	Discovery Education Science Techbook NGSS Case Studies for Differentiated Learners NGSS: All Standards, All Students Extensions - Enrichment Tasks/Projects	Discovery Education Science Techbook NGSS Case Studies for Differentiated Learners NGSS: All Standards, All Students Extensions - Enrichment Tasks/Projects	Discovery Education Science Techbook NGSS Case Studies for Differentiated Learners NGSS: All Standards, All Students Extensions - Enrichment Tasks/Projects	Discovery Education Science Techbook NGSS Case Studies for Differentiated Learners NGSS: All Standards, All Students Extensions - Enrichment Tasks/Projects	Discovery Education Science Techbook NGSS Case Studies for Differentiated Learners NGSS: All Standards, All Students Extensions - Enrichment Tasks/Projects